What is claimed is:

1. A method of analyzing diffraction patterns, comprising:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first similarity, the second similarity, and the third similarity.

2. The method of claim 1, further comprising normalizing the intensity of the diffraction patterns.

3. The method of claim 1 further comprising angle truncation of the diffraction patterns.

4. The method of claim 1 further comprising compensating the baseline of the diffraction patterns.

5. The method of claim 1 further comprising smoothing the diffraction patterns.

6. The method of claim 1 further comprising removing the broad features of the diffraction patterns.

7. The method of claim 1 further comprising computing the variance of the diffraction patterns.

8. The method of claim 1 further comprising detecting the potential presence of preferred orientation and particle statistics of the diffraction patterns.

9. The method of claim 1, further comprising:

normalizing the intensity of the diffraction patterns;

truncating the angle of the diffraction patterns;

correcting the baseline of the diffraction patterns;

smoothing the diffraction patterns;

removing any broad features of the diffraction patterns;

computing the variance of the diffraction patterns; and

detecting the potential presence of preferred orientation and particle statistics of the diffraction patterns.

10. The method of claim 1, wherein the similarities are determined based on the characteristic peaks of the diffraction patterns.

11. The method of claim 10, wherein determining the similarities based on the peaks comprises:

detecting crystalline peaks in the diffraction patterns; and

matching the diffraction patterns based on the detected crystalline peaks.

12. The method of claim 10, wherein determining the similarities based on the peaks comprises:

detecting amorphous peaks in the diffraction patterns; and

matching the diffraction patterns based on the detected amorphous peaks.

13. The method of claim 10, wherein detecting characteristic peaks further comprises:

determining the characteristic peaks of the diffraction patterns;

assigning probability scores to the determined characteristic peaks of the diffraction pattern; and

discretely allocating the determined characteristic peaks into one or more groups based on the assigned probability scores.

14. The method of claim 10, wherein matching the diffraction patterns further comprises comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern.

15. The method of claim 13, wherein discretely allocating the determined characteristic peaks comprises discretely allocating the determined characteristic peaks into a first, a second, a third, and a fourth group based on the assigned probability scores.

16. The method of claim 15, wherein matching the diffraction patterns based on the detected characteristic peaks comprises comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern.

17. The method of claim 16, wherein comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern further comprises:

for each characteristic peak in the first group of the first diffraction pattern, comparing the characteristic peak in the first group of the first diffraction pattern with the characteristic peaks in the first, second, or third group of the second diffraction pattern and penalizing a matching score if the characteristic peak in the first group of the first diffraction pattern is not found in the first, second, or third group of the second diffraction pattern.

18. The method of claim 17, wherein comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern further comprises:

for each characteristic peak in the second group of the first diffraction pattern, comparing the characteristic peak in the second group of the first diffraction pattern with the characteristic peaks in the first, second, third, or fourth group of the second diffraction pattern and penalizing a matching score if the characteristic peak in the first group of the first diffraction pattern is not found in the first, second, third, or fourth group of the second diffraction pattern.

19. The method of claim 16, wherein matching the diffraction patterns based on the detected characteristic peaks further comprises comparing one or more detected characteristic peaks in the second diffraction pattern with one or more detected characteristic peaks in the first diffraction pattern.

20. The method of claim 1, wherein pre-processing the diffractions pattern further comprises smoothing the diffraction patterns.

21. The method of claim 1, wherein pre-processing the diffractions pattern further comprises scaling into a common measurement range the diffraction patterns.

22. The method of claim 1, wherein pre-processing the diffractions pattern further comprises scaling into a common step size the diffraction patterns.

23. The method of claim 1, wherein pre-processing the diffractions pattern further comprises normalizing the diffraction patterns.

24. The method of claim 1, wherein pre-processing the diffractions pattern further comprises:

smoothing the diffraction patterns;

scaling into a common measurement range the diffraction patterns;

scaling into a common step size the diffraction patterns; and

normalizing the diffraction patterns.

25. The method of claim 1, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern.

26. The method of claim 24, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern.

27. The method of claim 25, wherein matching the intensity envelopes comprises performing a least squares fitting of the first diffraction pattern and the second diffraction pattern.

28. The method of claim 1, further comprising generating the third diffraction pattern instead of receiving the third diffraction pattern.

29. The method of claim 28, wherein the third diffraction pattern is a simulated pattern of a disordered form and further wherein generating the third diffraction pattern comprises:

receiving a peak list; and

simulating disorder in the received peak list to generate a disordered pattern as the third diffraction pattern

30. The method of claim 29, wherein simulating disorder in the received peak list comprises:

simulating instrument parameters;

receiving an operator defined microstructure parameter;

modeling material disorder based on the received microstructure parameter; and

optimizing the disordered parameter.

31. The method of claim 1, wherein the hierarchical cluster analysis further comprises determining a cut off similarity of a dendrogram.

32. The method of claim 21, wherein the cut off similarity is based on the similarity of the patterns.

33. The method of claim 1, further comprising X-shifting the first diffraction pattern prior to determining the similarity between the first diffraction pattern and the second diffraction pattern and determining the similarity between the first diffraction pattern and the third diffraction pattern.

34. The method of claim 1, further comprising determining preferred orientation and particle statistics in the first diffraction pattern.

35. The method of claim 16, wherein comparing the peaks further comprises matching a split peak with a peak having a shoulder as an acceptable match.

36. The method of claim 10, wherein the characteristic peaks are detected based upon a threshold value.

37. The method of claim 36, wherein the threshold value is based on a computed variance.

38. The method of claim 36, wherein the threshold value is based on a noise level of the patterns.

39. The method of claim 1, wherein performing hierarchical cluster analysis further comprises using the minimum link methodology.

40. The method of claim 1, wherein performing hierarchical cluster analysis further comprises using the average link methodology.

41. The method of claim 1, wherein performing hierarchical cluster analysis further comprises using the maximum link methodology.

42. The method of claim 1, wherein hierarchical cluster analysis comprises identifying one or more clusters and further comprising identifying clusters that are mixtures of other clusters.

43. The method of claim 10, further comprising identifying the region of a characteristic peak.

44. The method of claim 25, further comprising determining the crystallinity of the patterns.

45. The method of claim 10, further comprising subtracting the characteristic peaks of the first pattern from the characteristic peaks of the second pattern, wherein the subtraction completely removes matching peaks regardless of amplitude.

46. The method of claim 1, further comprising visually constructing a fourth pattern based on operator input percentages of the first pattern and the second pattern.

47. The method of claim 46, further comprising comparing the fourth pattern with a pattern selected from the first pattern, the second pattern, and the third pattern.

48. A system for analyzing patterns, the system comprising:

a memory; and

a processor coupled to the memory for:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first similarity, the second similarity, and the third similarity.

49. The system of claim 48, further comprising normalizing the intensity of the diffraction patterns.

50. The system of claim 49 further comprising angle truncation of the diffraction patterns.

51. The system of claim 49 further comprising compensating the baseline of the diffraction patterns.

52. The system of claim 49 further comprising smoothing the diffraction patterns.

53. The system of claim 49 further comprising removing the broad features of the diffraction patterns.

54. The system of claim 49 further comprising computing the variance of the diffraction patterns.

55. The system of claim 49 further comprising detecting the potential presence of preferred orientation and particle statistics of the diffraction patterns.

56. The system of claim 49, further comprising:

normalizing the intensity of the diffraction patterns;

truncating the angle of the diffraction patterns;

correcting the baseline of the diffraction patterns;

smoothing the diffraction patterns;

removing any broad features of the diffraction patterns;

computing the variance of the diffraction patterns; and

detecting the potential presence of preferred orientation and particle statistics of the diffraction patterns.

57. The system of claim 1, wherein the similarities are determined based on the characteristic peaks of the diffraction patterns.

58. The system of claim 57, wherein determining the similarities based on the peaks comprises:

detecting crystalline peaks in the diffraction patterns; and

matching the diffraction patterns based on the detected crystalline peaks.

59. The system of claim 57, wherein determining the similarities based on the peaks comprises:

detecting broad features in the diffraction patterns, and

matching the diffraction patterns based on the detected broad features.

60. The system of claim 57, wherein detecting characteristic peaks further comprises:

determining the characteristic peaks of the diffraction patterns;

assigning probability scores to the determined characteristic peaks of the diffraction pattern; and

discretely allocating the determined characteristic peaks into one or more groups based on the assigned probability scores.

61. The system of claim 57, wherein matching the diffraction patterns further comprises comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern.

62. The system of claim 60, wherein discretely allocating the determined characteristic peaks comprises discretely allocating the determined characteristic peaks into a first, a second, a third, and a fourth group based on the assigned probability scores.

63. The system of claim 62, wherein matching the diffraction patterns based on the detected characteristic peaks comprises comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern.

64. The system of claim 63, wherein comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern further comprises:

for each characteristic peak in the first group of the first diffraction pattern, comparing the characteristic peak in the first group of the first diffraction pattern with the characteristic peaks in the first, second, or third group of the second diffraction pattern and penalizing a matching score if the characteristic peak in the first group of the first diffraction pattern is not found in the first, second, or third group of the second diffraction pattern.

65. The system of claim 64, wherein comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern further comprises:

for each characteristic peak in the second group of the first diffraction pattern, comparing the characteristic peak in the second group of the first diffraction pattern with the characteristic peaks in the first, second, third, or fourth group of the second diffraction pattern and penalizing a matching score if the characteristic peak in the first group of the first diffraction pattern is not found in the first, second, third, or fourth group of the second diffraction pattern.

66. The system of claim 63, wherein matching the diffraction patterns based on the detected characteristic peaks further comprises comparing one or more detected characteristic peaks in the second diffraction pattern with one or more detected characteristic peaks in the first diffraction pattern.

67. The system of claim 48, wherein pre-processing the diffractions pattern further comprises smoothing the diffraction patterns.

68. The system of claim 48, wherein pre-processing the diffractions pattern further comprises scaling into a common measurement range the diffraction patterns.

69. The system of claim 48, wherein pre-processing the diffractions pattern further comprises scaling into a common step size the diffraction patterns.

70. The system of claim 48, wherein pre-processing the diffractions pattern further comprises normalizing the diffraction patterns.

71. The system of claim 48, wherein pre-processing the diffractions pattern further comprises:

smoothing the diffraction patterns;

scaling into a common measurement range the diffraction patterns;

scaling into a common step size the diffraction patterns; and

normalizing the diffraction patterns.

72. The system of claim 48, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern.

73. The system of claim 71, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern.

74. The system of claim 72, wherein matching the intensity envelopes comprises performing a least squares fitting of the first diffraction pattern and the second diffraction pattern.

75. The system of claim 48, further comprising generating the third diffraction pattern instead of receiving the third diffraction pattern.

76. The system of claim 75, wherein the third diffraction pattern is a simulated pattern of a disordered form and further wherein generating the third diffraction pattern comprises:

receiving a peak list; and

simulating disorder in the received peak list to generated a disordered pattern as the third diffraction pattern

77. The system of claim 76, wherein simulating disorder in the received peak list comprises:

simulating instrument parameters;

receiving an operator defined microstructure parameter;

modeling material disorder based on the received microstructure parameter; and

optimizing the disordered parameter.

78. The system of claim 48, wherein the hierarchical cluster analysis further comprises determining a cut off similarity of a dendrogram.

79. The system of claim 68, wherein the cut off similarity is based on the similarity of the patterns.

80. The system of claim 48, further comprising X-shifting the first diffraction pattern prior to determining the similarity between the first diffraction pattern and the second diffraction pattern and determining the similarity between the first diffraction pattern and the third diffraction pattern.

81. The system of claim 48, further comprising determining preferred orientation and particle statistics in the first diffraction pattern.

82. The system of claim 63, wherein comparing the peaks further comprises matching a split peak with a peak having a shoulder as an acceptable match.

83. The system of claim 57, wherein the characteristic peaks are detected based upon a threshold value.

84. The system of claim 83, wherein the threshold value is based on a computed variance.

85. The system of claim 83, wherein the threshold value is based on a noise level of the patterns.

86. The system of claim 48, wherein performing hierarchical cluster analysis further comprises using the minimum link methodology.

87. The system of claim 48, wherein performing hierarchical cluster analysis further comprises using the average link methodology.

88. The system of claim 48, wherein performing hierarchical cluster analysis further comprises using the maximum link methodology.

89. The system of claim 48, wherein hierarchical cluster analysis comprises identifying one or more clusters and further comprising identifying clusters that are mixtures of other clusters.

90. The system of claim 57, further comprising identifying the region of a characteristic peak.

91. The system of claim 72, further comprising determining the crystallinity of the patterns.

92. The system of claim 57, further comprising subtracting the characteristic peaks of the first pattern from the characteristic peaks of the second pattern, wherein the subtraction completely removes matching peaks regardless of amplitude.

93. The system of claim 48, further comprising visually constructing a fourth pattern based on operator input percentages of the first pattern and the second pattern.

94. The system of claim 93, further comprising comparing the fourth pattern with a pattern selected from the first pattern, the second pattern, and the third pattern.

95. A machine-readable magnetic medium comprising instructions stored on the medium, the instruction when executed perform the stages of:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first similarity, the second similarity, and the third similarity.

96. The machine-readable magnetic medium of claim 95, further comprising instructions for normalizing the intensity of the diffraction patterns.

97. The machine-readable magnetic medium of claim 95 further comprising instructions for angle truncation of the diffraction patterns.

98. The machine-readable magnetic medium of claim 95 further comprising instructions for compensating the baseline of the diffraction patterns.

99. The machine-readable magnetic medium of claim 95 further comprising instructions for smoothing the diffraction patterns.

100. The machine-readable magnetic medium of claim 95 further comprising instructions for removing the broad features of the diffraction patterns.

101. The machine-readable magnetic medium of claim 95 further comprising instructions for computing the variance of the diffraction patterns.

102. The machine-readable magnetic medium of claim 95 further comprising instructions for detecting the potential presence of preferred orientation and particle statistics of the diffraction patterns.

103. The machine-readable magnetic medium of claim 95, further comprising instructions for:

normalizing the intensity of the diffraction patterns;

truncating the angle of the diffraction patterns;

correcting the baseline of the diffraction patterns;

smoothing the diffraction patterns;

removing any broad features of the diffraction patterns;

computing the variance of the diffraction patterns; and

detecting the potential presence of preferred orientation and particle statistics of the diffraction patterns.

104. The machine-readable magnetic medium of claim 95, wherein the similarities are determined based on the characteristic peaks of the diffraction patterns.

105. The machine-readable magnetic medium of claim 104, wherein determining the similarities based on the peaks comprises:

detecting crystalline peaks in the diffraction patterns; and

matching the diffraction patterns based on the detected crystalline peaks.

106. The machine-readable magnetic medium of claim 104, wherein determining the similarities based on the peaks comprises:

detecting broad features in the diffraction patterns; and

matching the diffraction patterns based on the detected broad features.

107. The machine-readable magnetic medium of claim 104, wherein detecting characteristic peaks further comprises:

determining the characteristic peaks of the diffraction patterns;

assigning probability scores to the determined characteristic peaks of the diffraction pattern; and

discretely allocating the determined characteristic peaks into one or more groups based on the assigned probability scores.

108. The machine-readable magnetic medium of claim 104, wherein matching the diffraction patterns further comprises comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern.

109. The machine-readable magnetic medium of claim 107, wherein discretely allocating the determined characteristic peaks comprises discretely allocating the determined characteristic peaks into a first, a second, a third, and a fourth group based on the assigned probability scores.

110. The machine-readable magnetic medium of claim 109, wherein matching the diffraction patterns based on the detected characteristic peaks

comprises comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern.

111. The machine-readable magnetic medium of claim 110, wherein comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern further comprises:

for each characteristic peak in the first group of the first diffraction pattern, comparing the characteristic peak in the first group of the first diffraction pattern with the characteristic peaks in the first, second, or third group of the second diffraction pattern and penalizing a matching score if the characteristic peak in the first group of the first diffraction pattern is not found in the first, second, or third group of the second diffraction pattern.

112. The machine-readable magnetic medium of claim 111, wherein comparing one or more detected characteristic peaks in the first diffraction pattern with one or more detected characteristic peaks in the second diffraction pattern further comprises:

for each characteristic peak in the second group of the first diffraction pattern, comparing the characteristic peak in the second group of the first diffraction pattern with the characteristic peaks in the first, second, third, or fourth group of the second diffraction pattern and penalizing a matching score if the characteristic peak in the first group of the first diffraction pattern is not found in the first, second, third, or fourth group of the second diffraction pattern.

113. The machine-readable magnetic medium of claim 110, wherein matching the diffraction patterns based on the detected characteristic peaks further comprises comparing one or more detected characteristic peaks in the second

diffraction pattern with one or more detected characteristic peaks in the first diffraction pattern.

114. The machine-readable magnetic medium of claim 95, wherein pre-processing the diffractions pattern further comprises smoothing the diffraction patterns.

115. The machine-readable magnetic medium of claim 95, wherein pre-processing the diffractions pattern further comprises scaling into a common measurement range the diffraction patterns.

116. The machine-readable magnetic medium of claim 95, wherein pre-processing the diffractions pattern further comprises scaling into a common step size the diffraction patterns.

117. The machine-readable magnetic medium of claim 95, wherein pre-processing the diffractions pattern further comprises normalizing the diffraction patterns.

118. The machine-readable magnetic medium of claim 95, wherein pre-processing the diffractions pattern further comprises:

smoothing the diffraction patterns;

scaling into a common measurement range the diffraction patterns;

scaling into a common step size the diffraction patterns; and

normalizing the diffraction patterns.

119. The machine-readable magnetic medium of claim 95, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern.

120. The machine-readable magnetic medium of claim 118, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern.

121. The machine-readable magnetic medium of claim 119, wherein matching the intensity envelopes comprises performing a least squares fitting of the first diffraction pattern and the second diffraction pattern.

122. The machine-readable magnetic medium of claim 95, further comprising generating the third diffraction pattern instead of receiving the third diffraction pattern.

123. The machine-readable magnetic medium of claim 122, wherein the third diffraction pattern is a simulated pattern of a disordered form and further wherein generating the third diffraction pattern comprises:

receiving a peak list; and

simulating disorder in the received peak list to generated a disordered pattern as the third diffraction pattern

124. The machine-readable magnetic medium of claim 123, wherein simulating disorder in the received peak list comprises:

simulating instrument parameters;

receiving an operator defined microstructure parameter;

modeling material disorder based on the received microstructure parameter; and

optimizing the disordered parameter.

125. The machine-readable magnetic medium of claim 95, wherein the hierarchical cluster analysis further comprises determining a cut off similarity of a dendrogram.

126. The machine-readable magnetic medium of claim 115, wherein the cut off similarity is based on the similarity of the patterns.

127. The machine-readable magnetic medium of claim 95, further comprising X-shifting the first diffraction pattern prior to determining the similarity between the first diffraction pattern and the second diffraction pattern and determining the similarity between the first diffraction pattern and the third diffraction pattern.

128. The machine-readable magnetic medium of claim 95, further comprising determining preferred orientation and particle statistics in the first diffraction pattern.

129. The machine-readable magnetic medium of claim 110, wherein comparing the peaks further comprises matching a split peak with a peak having a shoulder as an acceptable match.

130. The machine-readable magnetic medium of claim 104, wherein the characteristic peaks are detected based upon a threshold value.

131. The machine-readable magnetic medium of claim 130, wherein the threshold value is based on a computed variance.

132. The machine-readable magnetic medium of claim 130, wherein the threshold value is based on a noise level of the patterns.

133. The machine-readable magnetic medium of claim 95, wherein performing hierarchical cluster analysis further comprises using the minimum link methodology.

134. The machine-readable magnetic medium of claim 95, wherein performing hierarchical cluster analysis further comprises using the average link methodology.

135. The machine-readable magnetic medium of claim 95, wherein performing hierarchical cluster analysis further comprises using the maximum link methodology.

136. The machine-readable magnetic medium of claim 95, wherein hierarchical cluster analysis comprises identifying one or more clusters and further comprising identifying clusters that are mixtures of other clusters.

137. The machine-readable magnetic medium of claim 104, further comprising identifying the region of a characteristic peak.

138. The machine-readable magnetic medium of claim 119, further comprising determining the crystallinity of the patterns.

139. The machine-readable magnetic medium of claim 104, further comprising subtracting the characteristic peaks of the first pattern from the characteristic peaks of the second pattern, wherein the subtraction completely removes matching peaks regardless of amplitude.

140. The machine-readable magnetic medium of claim 95, further comprising visually constructing a fourth pattern based on operator input percentages of the first pattern and the second pattern.

141. The machine-readable magnetic medium of claim 140, further comprising comparing the fourth pattern with a pattern selected from the first pattern, the second pattern, and the third pattern.

142. A method of analyzing patterns, comprising:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns based on the characteristic peaks of the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns based on the characteristic peaks of the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns based on the characteristic peaks of the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first, the second, and the third similarity.

143. A system for analyzing patterns, the system comprising:

a memory; and

a processor coupled to the memory for:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns based on the characteristic peaks of the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns based on the characteristic peaks of the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns based on the characteristic peaks of the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first, the second, and the third similarity.

144. A machine-readable magnetic medium comprising instructions stored on the medium, the instruction when executed perform the stages of:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns based on the characteristic peaks of the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns based on the characteristic peaks of the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns based on the characteristic peaks of the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first, the second, and the third similarity.

145. A method of analyzing patterns, comprising:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns based on the intensity envelopes of the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns based on the intensity envelopes of the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns based on the intensity envelopes of the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first, the second, and the third similarity.

146. A system for analyzing patterns, the system comprising:

a memory; and

a processor coupled to the memory for:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns based on the intensity envelopes of the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns based on the intensity envelopes of the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns based on the intensity envelopes of the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first, the second, and the third similarity.

147. A machine-readable magnetic medium comprising instructions stored on the medium, the instruction when executed perform the stages of:

receiving a first diffraction pattern;

receiving a second diffraction pattern;

receiving a third diffraction pattern;

determining a first similarity between the first and the second diffraction patterns based on the intensity envelopes of the first and the second diffraction patterns;

determining a second similarity between the first and the third diffraction patterns based on the intensity envelopes of the first and the third diffraction patterns;

determining a third similarity between the second and the third diffraction patterns based on the intensity envelopes of the second and the third diffraction patterns; and

performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first, the second, and the third similarity.

148. A method of analyzing a pattern of a disordered form, comprising:

receiving a diffraction pattern of the disordered form;

simulating a simulated disordered form based on the peak list of the ordered form; and

matching the simulated disordered form to the diffraction pattern of the disordered form.

149. A system for analyzing a pattern of a disordered form, the system comprising:

a memory; and

a processor coupled to the memory for:

receiving a diffraction pattern of the disordered form;

simulating a simulated disordered form based on the peak list of the ordered form; and

matching the simulated disordered form to the diffraction pattern of the disordered form.

150. A machine readable magnetic medium comprising instructions stored on the medium, the instruction when executed perform the stages of:

receiving a diffraction pattern of a disordered form;

simulating a simulated disordered form based on the peak list of the ordered form; and

matching the simulated disordered form to the diffraction pattern of the disordered form.

151. A method of matching patterns, comprising:

performing pattern matching on three or more pattern to determine similarities between the patterns; and

performing hierarchical cluster analysis on the three or more patterns based on the determined similarities.

152. A method of solid form screening, comprising:

solidifying a material under a first condition to generate a first resulting solid;

solidifying a material under a second condition to generate a second resulting solid;

analyzing the first resulting solid and the second resulting solid by diffraction analysis to generate a respective first diffraction pattern and a second diffraction pattern;

determining a similarity between the first diffraction pattern and the second diffraction pattern; and

performing hierarchical cluster analysis using the similarity.

153. A system for performing solid form screening, the system comprising:

a memory; and

a processor coupled to the memory for:

solidifying a material under a first condition to generate a first resulting solid;

solidifying a material under a second condition to generate a second resulting solid;

analyzing the first resulting solid and the second resulting solid by diffraction analysis to generate a respective first diffraction pattern and a second diffraction pattern;

determining a similarity between the first diffraction pattern and the second diffraction pattern; and

performing hierarchical cluster analysis using the similarity.

154. A machine-readable magnetic medium comprising instructions stored on the medium, the instruction when executed perform the stages of:

solidifying a material under a first condition to generate a first resulting solid;

solidifying a material under a second condition to generate a second resulting solid;

analyzing the first resulting solid and the second resulting solid by diffraction analysis to generate a respective first diffraction pattern and a second diffraction pattern;

determining a similarity between the first diffraction pattern and the second diffraction pattern; and

performing hierarchical cluster analysis using the similarity.